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ABSTRACT

The relationship between student persistence and types of financial aid at a Jesuit comprehensive university was studied. Three freshmen cohorts (134 for 1989, 171 for 1990, and 131 for 1991) of 436 students were tracked through fall 1994. Attention was focused on nine financial aid variables, five additional noncategorical and six categorical variables and their relationship to yearly persistence to graduation. Nine models were derived using logistic regression. Although loans were a significant discriminator between persisters and nonpersisters for white males and females during their freshmen year, academic ability of students may have influenced the results since the institutional financial aid award policy establishes an inverse relationship between the amount of loans that make up a student's financial aid package and their academic ability. As students progressed toward graduation, the amount of financial aid award and unmet need became more important discriminators than types of financial aid. College grade point average was found to be the strongest discriminator of all 20 variables in predicting persistence during the first 3 years. Ethnicity, gender, and year in school appeared to be important variables in studying different types of financial aid and other variables on persistence. (Contains 12 references.) (Author/SW)

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THE EFFECT OF TYPES OF FINANCIAL AID ON STUDENT PERSISTENCE TOWARDS GRADUATION

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Jean Endo
Editor
AIR Forum Publications

THE EFFECT OF TYPES OF FINANCIAL AID ON STUDENT PERSISTENCE TOWARDS GRADUATION

Abstract:

The purpose of this study is to ascertain the relationship between student persistence and types of financial aid at an independent, comprehensive university. Three freshmen cohorts--1989, 1990, and 1991--are tracked through Fall 1994. The study looks at nine financial aid variables, five additional non-categorical and six categorical variables and their relationship to yearly persistence to graduation. Nine models were derived using logistic regression. Although loans were a significant discriminator between persisters and nonpersisters for white males and females during their freshmen year, academic ability of students may be influencing the results since the institutional financial aid award policy establishes an inverse relationship between the amount of loans that make up a student's financial aid package and their academic ability. As students progressed towards graduation, the amount of financial aid award and unmet need become more important discriminators than types of financial aid. College GPA was found to be the strongest discriminator of all twenty variables in the first three years of persistence. Both ethnicity and gender were found to be significant variables when measuring the effect of different types of financial aid and other variables on persistence.

THE EFFECT OF TYPES OF FINANCIAL AID ON STUDENT PERSISTENCE TOWARDS GRADUATION

Introduction and Perspective:

In the past educators have emphasized the importance of access and choice as the necessary components of equal educational opportunity. Notwithstanding some data to the contrary (e.g., Hansen, 1983), studies such as the College Student Study (Fife and Leslie, 1976) and the Leslie, Johnson, and Carlson study (1977) suggest the positive impact of financial aid on access and choice. However, it is not enough for individuals to obtain access to the educational institution of their choice. The duration of their stay in the educational environment and their persistence towards some objective is associated with their eventual human capital worth. Therefore, persistence becomes an important third component in measuring equal educational opportunity.

As the cost of higher education increases, institutions are faced with the need to increase tuition rates. The effect of that increase on student access, choice and persistence is accentuated by the movement of the federal and state governments to approach educational subsidization through increased student loans and reduced grants-in-aid. This approach raises questions as to whether the higher education system can continue to meet the objective of equal educational opportunity. Institutions would be assisted if research found a way to truly measure the effect of types of financial aid on student persistence and how much of the tuition dollar needs to be returned to the student through financial aid to ensure his/her graduation. Whether the type of financial aid that affects student persistence changes as the student progresses towards graduation would be beneficial information to institutions when allocating their financial aid dollars to the student recruitment or retention.

The purpose of this study is to ascertain the relationship between types of financial aid and continuous student persistence to graduation of three freshmen cohort groups enrolled in an independent, four-year Jesuit university. The study specifically looks at relationships among the types of financial aid while controlling for dollar amount through the inclusion of financial aid need, unmet need, and total

financial aid award amount as independent variables. A second purpose of the study was to create a predictor model for continuous persistence to graduation at this institution relying on only those variables readily available upon admission of the students as freshmen.

Literature Review:

A meta-analysis of studies since the 1970's has shown the effectiveness of financial aid on student persistence to be positive (Murdock, 1987). Overall, students receiving financial aid persisted at the same rates as students not receiving financial aid. The purpose of most financial aid is to remove economic barriers and decrease the probability of dropping out for financial reasons. Assuming that financial aid is targeted on the lower-income student, the meta-analysis confirmed that financial aid is achieving the objective of equal educational opportunity by enabling the lower-income students to persist at a level almost equal to that of middle- and upper-income students.

However, Murdock (1989, 1990) questions the reliability of past studies that have attempted to measure the effect of types of financial aid on persistence. Some studies measured the types of financial aid by the dollar amount received, and some studies merely measured the types dichotomously. Evaluating the effect of different forms of aid on persistence is confounded by the influence of dollar amount. It is possible that studies using dollar amount as a measurement are showing more the effect of the size of an award than the type of award. Recent studies have attempted to address this problem by including tuition costs and unmet needs into their analysis (St. John, et. al, 1994) and on student's ability to pay (Cabrera, et. al., 1990). However, a study has yet to truly determine the effect of various types of financial aid by controlling for the influence of dollar amounts. When St. John, et. al (1994) looked at types of financial aid and included tuition and unmet need as variables in a logistic regression study, the results were inconclusive as to the effectiveness of different types of financial aid on persistence. Results were mixed on the effect of loans. The study also indicated that there were differences between private institutions and public institutions in the effects of types of financial aid and unmet need on

persistence. Therefore, more research is needed to provide insight on the relationship among loans, unmet need, and academic ability to guide federal, state, and institutional financial aid policy.

It also appears that financial aid has a stronger effect on persistence during the latter years of college than on the freshmen year, particularly in terms of graduation probability (Murdock 1989,1990). Past retention studies have confirmed that variables showing a statistically significant influence on freshman persistence are not necessarily significant variables operating on student persistence during the sophomore, junior, or senior years (St. John, et. al., 1991). Knowledge of the sequential effect of financial aid and types of financial aid on persistence as students progress towards their degree would assist institutions in determining the best packaging of financial aid to increase graduation rates.

Methodology:

The Sample:

The study population consisted of the 1989, 1990, and 1991 cohort groups of entering freshmen who were first-time, full-time U.S. citizens and who had been awarded financial aid their freshmen year. The objective of the study was to determine whether financial aid as an operative of equal educational opportunity policy has an effect on continuous persistence. Therefore, students who did not show need but received institutional or outside scholarships were excluded from the sample. Data were retrieved from the student information systems and the financial aid data base of the institution. After eliminating 189 individuals records from the pool because of incomplete data, the final sample size for all three cohort groups was 436 students. Of that number a total of 250 students were retained or graduated and 186 students were lost through attrition over a four-year period. The sample size for each freshman cohort group was 134 for 1989, 171 for 1990, and 131 for 1991. The cohort groups were followed from year-to-year to measure continuous enrollment or graduation through Fall 1994. The effect on persistence and graduation of the nine financial aid variables, five additional non-categorical variables, and six categorical variables were analyzed from year-to-year within each cohort.

Persistence was the dichotomous, dependent variable and defined as continuous enrollment or graduation over a four-year period. Types of financial aid studied included grants, loans, workstudy, institutional scholarships, outside scholarships, and special awards. Grants included federal and state awards; workstudy included federal and institutional workstudy awards; loans included Perkins, Stafford, PLUS, and NDSL while special awards included financial aid awards not measured in the previous categories. Categories of combined financial aid packages were not included as variables because of the desire to measure the influence of loans no matter what percent they composed of a financial aid package.

Additional independent financial aid variables included total financial aid need, total amount of aid awarded, and unmet financial need. High school GPA, high school rank, SAT Verbal scores, and SAT Math scores served as additional non-categorical variables while academic major (science, engineering, business, nursing, humanities/social sciences, and premajor), religion (Catholic or non-Catholic), state residence, campus residence, gender, and ethnicity served as categorical variables. College GPA was added as a variable after the first-year of tracking for each cohort.

Measurement:

Logistic regression analysis was chosen as the model because it has the advantage of allowing analysis to mix continuous and categorical variables, especially for binary dependent variables (Hanushek and Jackson, 1977). Stepwise logistic regression was applied to determine the significance of each independent variable. The final model was the probability of persistence based on the statistically significant independent variables derived from the stepwise logistic regression.

In order to determine whether the cohort groups could be combined to increase cell size and thus strengthen the logistic regression model, a correlation coefficient and confident intervals were computed for each variable corresponding to the first-, second-, third- and four-year attrition and retention of each individual cohort group and the combined sample of 436. Financial aid need and award amount were adjusted to compensate for annual tuition increases. The results of the simple correlation and confident

interval analyses revealed that the three cohorts could be combined for the first-year or freshman year of retention. Relevant differences among cohorts were depicted for the second-year retention analysis and allowed combining only the 1990 and 1991 cohorts. It also became apparent that by the third and fourth years of the study, the attrition population had decreased to such a small number that inclusion of the junior and senior years in the logistic regression model had the probability of producing invalid results. The decision was made to use confident interval, correlation coefficient, and beta weight analysis to study those two years.

The sophomore year logistic regression showed ethnicity and college GPA to have a statistically significant effect upon retention. The fact that ethnicity was shown to be a major variable in the model led to the decision to categorize the population by ethnicity. Since gender had been shown earlier by simple correlation to be significantly related to a number of financial aid variables, the sample was further separated by gender. Past studies, including information from national surveys such as the Cooperative Institutional Research Program (CIRP), on the various ethnic groups at the institution, had shown the Hispanic, Black, and Native American populations to be somewhat comparable when analyzing the variables included in this study, while the Asian population was significantly different from the other three ethnic groups. Therefore, the Asian population was designated as a separate ethnic category but the Hispanic, Black, and Native American (HBN) populations were combined to maintain a relatively decent sample size for analysis.

Logistic regression was performed on the combined and separate cohorts by ethnicity and gender for the freshman year. Five models were established to measure first-year persistence for the following groups: total cohort, white female, white male, HBN females, and HBN males. No significant variables were found in either the Asian males or females first-year logistic regression. The second-year logistic regression was performed on the combined and separate cohort groups by ethnicity. Since gender was not found to be a determining variable in the model for the sophomore year, it was decided not to further categorize by gender in order to maintain a larger sample size. Four models were established to measure

second-year persistence for the following groups: combined 1990 and 1991 cohorts, whites, Asian, and HBN.

To further enhance the analysis of the effect of financial aid on continuous persistence for the third and fourth years, beta weights were calculated from the multiple regression coefficients to analyze the significance of each financial aid variable on retention by year. In this manner it was hoped to determine whether the types of financial aid influencing students each year changed as they progressed towards graduation.

Results:

First-Year Persistence:

The logistic regression on the combined sample of 436 identified loans and HS GPA as significant predictive variables influencing a student's retention to the sophomore year (Table 1). The model showed a predictive accuracy of 98.55% for the retained groups and 5.49% for the attrition group. Confident levels showed that retained students had lower loan awards and higher HS GPAs than students who did not persist. The results of the simple correlation and confident analysis for the total cohort group are displayed on Table 2.

TABLE 1: Logistic Regression Model Measure of Accuracy, Beta Values and Variable First Year

Group (N=436)	Attrition	Retention	Model Accuracy	Variables	Beta List	Constant
Total	5%	99%	79%	Loan, HS_GPA	-.0002, .9471	-1.0883
White-Female	11%	97%	78%	Loan	-.0005	2.8029
White-Male	57%	95%	86%	Loan, Work-Study, HS_GPA	-.0004, .0006, 1.8936	-4.3353
HBN-Female	50%	93%	83%	SAT_MATH	.0249	-9.0194
HBN-Male	80%	100%	91%	HS_RANK	.1093	-8.4741

The logistic regression categorizing both gender and ethnicity first-year retention revealed loans for white females; loans, work-study, and HS GPA for white males; SAT Math for HBN females and HS rank for HBN males as significant variables. Confident intervals showed the white females who persisted to the second year had lower loan awards; white males who persisted had lower loan awards,

lower work-study awards, and higher HS GPAs; HBN females who persisted had lower SAT Math scores; and HBN males had higher HS rank than those students who did not persist. No variables showed significance among the Asian female or male groups. The percent of accuracy the model tested for each gender/ethnic group is shown on Table 1. The model showed the greatest overall accuracy for both the retained and attrition groups of HBN males.

TABLE 2: Significant Variables Identified by Correlation Coefficients and Confident Intervals First Year

For the 1989, 1990 & 1991 Cohorts By Gender and Ethnicity

Variables	Total Cohort		White		Asian		HBN	
	Correlation	Confid. Interval	Female	Male	Female	Male	Female	Male
	*p <=0.05 **p <=0.01	p <= .05	p <= .05	p <= .05	p <= .05	p <= .05	p <= .05	p <= .05
SAT Math	+ **	+	+					
SAT Verb	+ *	+						+
FA Need								
FA Award			+					
Grant	- *	-	-					
Loan	- **	-	-	-			+	
Inst Schol	+ **	+	+	+				
Out Schol	+ *	+						
Workstudy	- **	-						
Special								
Unmet Need		-	-					
HS GPA	+ **	+	+	+				
HS Rank	+ **	+	+	+				+
SU GPA	NA	NA	NA	NA	NA	NA	NA	NA
Campus Res.								

When analyzed by gender and ethnicity the confident interval analysis revealed that, in at least one of the three cohort groups, White females who were retained through their first year had significantly higher institutional scholarship awards, SAT Math scores, HS GPA, and HS rank while showing lower grant award amounts, loans, and unmet need than White females who did not persist. White males, in at least one of the three cohort groups, who persisted to their sophomore year showed significantly higher institutional scholarship award, HS GPA, and HS rank while indicating lower loan amounts than White males who did not persist. Asian females and males who were retained through their first year showed no significant confident intervals in any of the three cohort samples. In the Hispanic, Black, and Native

American (HBN) category, in at least one of the three cohort groups, women who were retained through their first year showed significantly higher loan awards. HBN men, in at least one of the three cohort groups, who persisted through their first year of college showed a significantly higher SAT Verbal score and HS rank (Table 2).

Second-Year Persistence:

The logistic regression on the combined sample for second-year retention indicated total award amount, ethnicity, and college GPA as significant variables affecting retention to the junior year. The model showed an accuracy of 99% for the retained group and 17% for the attrition group (Table 3). Confident intervals revealed that retained students had higher award amounts and college GPAs. As in the first year, ethnic group retention was highest for Asians, followed the White and HBN categories.

TABLE 3: Logistic Regression Model Measure of Accuracy, Beta Values, and Variables Second Year

Group (N=345)	Attrition	Retention	Model Accuracy	Variables	Beta List	Constant
Total	17%	99%	85%	Adj_Awrd, Ethnic(1), Ethnic(2), Ethnic(3), SU_GPA	.000083, -.3082, .9341, -.2866, 1.3425	-3.2629
90+91 (N=245)	32%	98%	86%	Ethnic(1), Ethnic(2), Ethnic(3), SU_GPA	-.4870, 1.5605, -.2741, 2.2866	-5.1428
90+91 White	32%	97%	83%	HS_GPA, FA_UNMET, SU_GPA	-1.4832, -.0002, 2.6005	-1.7234
90+91 Asian	33%	97%	92%	InOutState(1), SU_GPA	1.4207, 3.5973	-6.724
90+91 HBN	60%	92%	82%	HS_RANK	.1793	-13.7906

The logistic regression, categorized by ethnicity for the 1990 and 1991 cohorts, for second-year retention identified HS GPA, financial aid unmet need, and college GPA for Whites; state residency and college GPA for Asians; and HS rank for HBNs as significant variables (Table 3). White students who were retained into their junior years had higher HS GPAs, lower unmet financial aid need, and higher college GPAs than students who were not retained. The beta coefficient for HS GPA for Whites indicated a negative sign; however, upon further partial correlation analysis college GPA was found to be influencing the outcome. Asian students retained through their second year had a higher rate of state residency and college GPA; HBN students retained had a higher HS rank than those students who were

not retained. The overall accuracy of the model was highest for the Asian category followed by White and HBN. However, the model showed a 60% accuracy for the HBN attrition group (Table 3). Table 4 also identifies the correlation coefficients and confident interval analysis for second year retention.

TABLE 4: Significant Variables Identified by Correlation Coefficients and Confident Intervals Second Year

For the 1989, 1990 & 1991 Cohorts By Gender and Ethnicity

Variables	Total Cohort		White		Asian		HBN	
	Correlation	Confid. Interval	Female	Male	Female	Male	Female	Male
	*p <=0 05 **p <=0 01	p <= 05	p <= 05	p <= 05	p <= 05	p <= 05	p <= 05	p <= 05
SAT Math					+	+		
SAT Verb			+		+			
FA Need						+		
FA Award	+ **	+	+	+	+	+		
Grant						+		
Loan								
Inst Schol	+ **	+	+					
Out Schol								
Workstudy					+			
Special								
Unmet Need	- **	-	-	-				
HS GPA	+ **	+	+		+			
HS Rank	+ *	+	+		+			
SU GPA	+ **	+	+	+	+		+	
Campus Res.	+ *							

Third-Year Persistence:

Correlation coefficients showing positive significance to third-year retention were total award amount, institutional scholarships, SAT Math, HS GPA, HS rank, college GPA and year (1989, 1990, and 1991). The only significant negative correlations were unmet financial aid need and special awards. The confident intervals for the third year indicated that students who persisted into their senior year showed statistically significant higher SAT Verbal and Math scores, college GPA, HS rank, HS GPA, institutional scholarship awards, and total financial aid awards than students who did not persist. Students who did not persist into their senior year showed statistically significant higher financial aid need than students who persisted (Table 5).

TABLE 5: Significant Variables Identified by Correlation Coefficients and Confident Intervals Third and Fourth Years

Third Year			*Fourth Year*		
Variables	**1989, 1990, 1991 Cohort**		***Variables***	**1989 and 1990 Cohort**	
	Correlation	Confid. Interval		Correlation	Confid. Interval
	*p <=0.05 **p <=0.01	p <=0.05		*p <=0.05 **p <=0.01	p <=0.05
SAT Math	+ *	+	SAT Math		
SAT Verb		+	SAT Verb		
FA Need			FA Need		
FA Award	+ *	+	FA Award	+ *	
Grant			Grant		
Loan			Loan		
Inst Schol	+ **	+	Inst Schol	+ **	+
Out Schol			Out Schol		+
Workstudy			Workstudy		
Special	- **		Special		
Unmet Need	- *	-	Unmet Need		
HS GPA	+ **	+	HS GPA	+ **	+
HS Rank	+ **	+	HS Rank	+ **	+
SU GPA	+ **	+	SU GPA	+ **	+

Beta weights were calculated from the multiple regression coefficients to provide the order of significance of each financial aid variable on retention. The relative importance of the financial aid variables to third-year persistence in descending order was institutional scholarship, special awards (-), outside scholarships, grant awards, total financial aid award (-), loans, unmet financial aid need (-), and workstudy (Table 6).

Fourth-Year Persistence:

Correlation coefficients showing positive significance during the fourth year of persistence to graduation were total award amount, institutional scholarship awards, HS GPA, HS rank, and college GPA. The confident intervals for the fourth year revealed that students who either graduated or were retained showed significantly higher institutional scholarships, outside scholarships, HS GPA, HS rank, and college GPA while indicating a significantly lower loan award amount than students who did not persist (Table 5).

Beta weight analysis showed the relative importance of the financial aid variables to second-year persistence in descending order as institutional scholarships, total financial aid award (-), outside scholarships, grant award, unmet financial aid need, loans, and workstudy.

Limitations:

Conclusions and inferences have to be placed in the context that the sample population was composed of mostly traditional aged, full-time freshmen who were attending an independent, comprehensive institution with moderately high tuition. Approximately eighty-two percent of full-time freshmen students receive some form of financial aid. The results of this study, therefore, are not generalizable to students at other institutions not having a similar profile.

Although cohort groups were combined to increase sample size, the small number of students composing the attrition groups during the junior and senior years caused problems in the research model. We were able to test several logistic regression models across different ethnic-gender combinations the first year and across different ethnic groups the second year; however, we were not able to do so the third and fourth years because of the small sample size of the attrition group. Other researchers have confronted the same problem with sample sizes much larger than this study's sample (Stampen and Cabrera, 1986; Mallette and Cabrera, 1991). Even though the "Other" ethnic categorization was included in the logistic regressions, correlation coefficients, and confident analysis, the results are not reported because again the size of the sample was considered too small.

Conclusions:

In combination, the nine logistic regression models, the correlation coefficients, and the confident intervals provide a wealth of information to examine the effect of types of financial aid on persistence and on the relationship between financial aid and academic ability on persistence towards graduation.

1. The type of financial aid a student receives during their first year is a significant determinant of retention only of the white students. Type of financial aid received the first year does not appear to be a significant determinant of whether students of Asian, Hispanic, African

American, or Native American ethnicity persist to their sophomore year. In this study, loans were the only major financial aid variable discriminating between first-year retention and attrition of white freshmen females and males. Loans had a negative effect on the white students since students who did not return for their sophomore year had higher loan awards than those who persisted. That finding was not consistent for other ethnic groups. Although not a significant predictor, loans had a positive effect on Asian females and HBN females. The two groups who persisted had higher loan awards their first year than Asian and HBN females who did not persist. Therefore, the contention that loans have a more negative effect on minority populations than white students is not totally supported by this study. Loans had a negative effect on males of all ethnic groups and only the white female category.

Workstudy also was found to be a discriminator for white males during the first year. White males who were retained to their sophomore year had less workstudy awards than those who did not persist. Although not significant, the study showed white females, Asian males, and Asian females who persisted to the second year to have lower workstudy awards than those who did not persist. HBN males and females who persisted had higher workstudy awards. This finding may reflect that for white males the hours required for workstudy may be a detractor to studies and thus have a negative effect on retention. Interestingly, this is not the case for HBN males and females who may find the social interaction and mentoring often associated with workstudy to have as much of a positive effect upon retention as the amount of money received.

It is important to note that the first-year logistic regression also showed HS GPA to be a significant discriminating variable for white males. It also had the largest beta coefficient of the three variables shown to be significant (Table 1). White males who persisted to their sophomore year had significantly higher HS GPAs than those white males who did not persist. Academic ability as measured by HS GPA may be influencing the first-year retention of white males in a much more significant manner than financial aid. When freshmen college GPAs are compared, the confident intervals indicate those white males who persisted had a significantly higher college GPA than those who did not persist.

When the institutional financial aid award policy was examined, it was found that a formula based on SAT and GPA scores determined the financial aid packaging. Students with the highest academic rankings received 70%, while students with the lowest rankings received 40%, of their financial aid in the form of grants and institutional scholarships. The remaining percentage of the financial award packages was completed through workstudy and loans. Therefore, students with the middle or lower academic rankings received higher loan and workstudy awards. The fact that SAT scores and HS GPA are better predictors for the white male and white female populations in this study may explain why loans showed a negative effect and were not a significant discriminator for other ethnic and gender categories. It also may answer the question as to why workstudy has a negative effect on white males, if the majority of those awarded workstudy have the tendency to have lower HS GPAs. The question must be asked, "Are loans showing a negative effect because it is really the academic ability of students determining persistence or do loans and workstudy place an academically at-risk student in further jeopardy of dropping-out?"

2. It is not the type of financial aid but rather the unmet need and award amount that are the most significant financial aid determinants of whether students are retained from their sophomore year to their junior year. All students in this study who were retained to their junior year, no matter their ethnicity or gender, showed significantly higher award amounts and less unmet need than those students who did not persist. St. John, et. al. (1994) also found unmet need and award amount to have a significant effect on within-year persistence.

3. Unmet need and financial aid award amount continue to discriminate between students who persist into their senior year and those who do not persist. However, institutional scholarship awards becomes another important financial aid discriminator between persisters and non-persisters. Correlation coefficients and confident intervals both indicated unmet need, financial aid award, and institutional scholarships as significant. All students who were retained into their senior year consistently displayed higher award amounts and institutional scholarships and lower unmet need than

those students who did not persist. It is important to note that retained students for all three cohorts were found to be receiving more financial aid than their computed financial need compared to those who were not retained.

4. Institutional scholarship and outside scholarships are financial aid variables that appear to discriminate between those who graduate or persist their senior year and those who do not persist. Students who graduated or persisted through their senior year had higher institutional scholarships and outside scholarships. However, as discussed in the next conclusion, the relationship between college GPA and institutional scholarship cannot be ignored when interpreting these results. The correlation coefficient for these two variables during the fourth year was the highest positive coefficient among all 20 variables.

5. The academic success of the student as measured by college GPA becomes the most important discriminating variable measuring yearly persistence. College GPA was shown consistently to have one of the highest direct correlations with yearly persistence and had the largest beta coefficient of the variables showing significance in the second-year logistic regression. Confident intervals for each year indicated that students, in all ethnic and gender categories, who were retained from one year to the next had significantly higher college GPAs than those who did not persist. When college GPA was added to the variables for first-year retention, it had the highest correlation coefficient and increased the accuracy of the first-year logistic model. College GPA increased the accuracy for the attrition group 280% and decreased the accuracy of the retained group by 0.3% for a total increase in the accuracy of the model of 3.8%.

6. The variables normally used to select or admit students into college are not the best discriminators of first-year persistence and attrition for the Asian American population. The logistic regression found no significant discriminating variables within the Asian American population for first-year retention. In addition, no significant confident intervals were found for the Asian males or females during the first year. This infers that other variables besides the regular pre-matriculation

measures of academic ability and financial aid are having a much larger impact on determining whether Asian American students persist their first year in college. In fact, the second-year logistic regression showed state residency and college GPA to be the significant discriminating variables. Asian American students who claimed out-of-state residency had a significantly higher attrition rate than those who lived in-state. This institution has a large Pacific Island student population. It is quite feasible that the effect we are seeing here is the result of that population. Out-of-state Asian American students appear to be more at-risk of not returning their junior year than their sophomore year. Although not significant, out-of-state Asian American students did show a higher attrition than Asian American in-state residents during their first year of college.

During the second year we do see the college GPA along with SAT scores, HS GPAs, and some financial aid variables showing significant confident intervals among the Asian American men and women. Still, the fact that these variables did not appear as significant in the second-year logistic regression model and that the model had the highest accuracy for the Asian American category probably speaks to the weakness of the pre-matriculation and financial aid variables in discriminating power for this ethnic group.

7. High School rank is the strongest variable discriminating between persisters and non-persisters for Hispanic, African American, and Native American males during their first and second years of college. SAT Math is the strongest discriminating variable for HBN females, which correlates with the academic major of the student. In both first- and second-year logistic models, HS rank was the sole variable showing significance for HBN males. HBN males who persisted to their sophomore and junior years were found to have higher HS rank than those who did not persist.

The first-year logistic model indicated SAT Math as a significant discriminator between HBN female persisters and non-persisters. Confident intervals reveal that HBN females who persisted to their sophomore year had lower SAT Math scores than those who did not persist. The confident intervals were not found to be significant. This trend continues through the second year but during the third and

fourth years, HBN females who persist or graduate show higher SAT Math scores than those who did not persist. Upon further investigation, the correlation between SAT Math and academic major revealed a significant negative coefficient for HBN females. The finding indicates that HBN females majoring in the sciences and engineering fields who have higher SAT Math scores are comprising more of the attrition group than HBN females majoring in the humanities, social sciences, and fine arts who have the lower SAT Math scores. Although not significant, this finding was also true for Asian females during their first year of persistence.

8. Ethnicity, gender, and the year had a significant effect on the study, whether in the results obtained through the logistic regression or differences found among cohort groups for purposes of combining. When the logistic regression was performed on the three cohort groups combined, the significant discriminators found were loans and HS GPA. However, when the same population was separated by gender and ethnicity those two variables were only found to be significant in the case of white males and only loans were found to be significant for white females (Table 1). During the second year the logistic regression of 1989, 1990, and 1991 combined cohort groups indicated total award amount, ethnicity and college GPA as significant discriminators. The model had an overall 84.93% of accuracy. When the 1989 cohort was eliminated from the sample, the accuracy of the model increased to 86.12%.

The logistic regression of the combined cohort groups of 1990 and 1991 indicated ethnicity and college GPA as significant discriminators. When the 1990 and 1991 cohort groups were separated by ethnicity only college GPA was found to be significant in the white and Asian categories (Table 3). In addition, HS GPA and financial unmet need were found to be significant discriminators for white students; state residency for Asian students, and HS rank for HBN students. Consequently, it is evident that these three variables--ethnicity, gender, and year--can play a significant part in the type of results obtained in financial aid and persistence studies.

Implications for Institutional Researchers:

The fact that ethnicity, gender, and year of study had such a significant effect on persistence and also the design of the model is an indicator to all researchers that the types of financial aid that influence persistence are not generalizable across students. The effect of different types of financial aid vary by ethnicity and by ethnicity and gender. In addition, the significance of the time variable brings into question the validity of models that are based on one cohort group. It is possible that the temporal factor may be the most significant variable operating when studies are replicated on different sample populations to test a model's validity. If possible, time series analyses should be performed to assist in strengthening persistence models, albeit most institutions do not have the luxury of ten years of accurate or complete financial aid data. However, autocorrelation could be used to identify the time-lag effect.

This study lends support to the hypothesis that the type of financial aid and the relationship of financial aid to persistence changes with each year a student progresses towards graduation. Because of the small sample size, this study was not able to design a logistic regression model for the junior and senior years. More research needs to be performed to determine the effect of loans on those two years. It must be noted, however, that loans were not designated as significant variables the third or fourth years in either the correlation coefficients or confidence intervals. Loans also showed decreasing beta weights over the four year period compared to other types of financial aid. Institutional scholarship was found to be one of the most significant variables during the junior and senior year. However, there was a strong correlation between institutional scholarship and college GPA, which was a significant variable in determining whether a student persisted towards graduation. Students with higher institutional scholarship awards are enabled to acquire less loan indebtedness and work fewer hours in workstudy positions. These interrelated relationships require further analyses to determine whether academic ability rewarded by institutional scholarship is the primary determinant of student persistence or whether the academic ability of students who receive more loans and workstudy is effected negatively as they progress towards graduation.

The study points to the need to separate ethnic groups as much as possible in persistence research. It is encouraging to note that loans appear to play a positive force with most ethnic minorities. Admission personnel might also be alerted that regular admission criteria or academic prematriculation measures may not be predictive for certain ethnic and gender groups. In this study, Asian male and female persistence during the first year was dependent on variables other than precollege academic ability. Variables measuring family and peer group support, student self-esteem and confidence, and importance of the college degree to the student would strengthen persistence models. For most institutions this information is usually not readily available before a student enrolls in college. However, questions that provide information found to be significant non-academic predictors of student success for an institution could be incorporated into admission applications. There continues to be controversy over the validity of SAT scores in predicting college success for students of color, but the results of this study also indicate significant intercorrelations between SAT scores, the academic major, and gender.

College GPA appears to be the most significant nonfinancial aid determinant of persistence. Institutional research offices could assist faculty and student development offices by identifying students most likely to dropout through determining college GPA confident intervals for each year of enrollment and by gender and ethnicity.

More and more studies are beginning to confirm that retention or student persistence is institutional specific. The current research also confirms that the type of financial aid and its effect on persistence is ethnic and gender specific. The study provides a more discriminatory model to test the actual effect of different types of financial aid on students as they progress towards graduation at one institution. Institutional researchers can assist their own financial aid offices in determining what types of financial aid best contributes to their students' persistence during each year of their college enrollment.

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